

## APPENDIX A

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5  IF (it is time to perform housekeeping activities) THEN
    FOR (each TCP connection that has started to close, i.e. observed the TCP FIN flag set) DO
      IF (the time allowed for closure has passed) THEN
        Close this connection
      IF (this is the last connection with this user) THEN
        Reinitialize the user's profile and set the profile state to Incomplete
      ENDIF
    ENDIF
  NEXT

15 FOR (each connection that has been idle for the maximum allowed time) DO
  Close this connection

  IF (this is the last connection with this user) THEN
    Reinitialize the user's profile and set the profile state to Incomplete
  ENDIF
20 NEXT
ENDIF

25 IF (it is an IP packet) THEN
  IF (it is an IP/UDP packet) THEN
    Check the source and destination ports against a list of allowed well-known UDP ports

  IF (either port is on the allowed port list) THEN
    IF (the server port is for the XDMCP protocol) THEN
      Check the XDMCP Opcode against a list of allowed opcodes
    IF (the XDMCP Opcode is on the allowed opcode list) THEN
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Check if the XDMCP packet is being sent in an allowed direction

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35 IF (an allowed Opcode is being sent to the server or an allowed Opcode is being sent to the user) THEN
    IF (there is an established X-Windows connection with this user) THEN
        IF (the Opcode is other than KeepAlive or Alive) THEN
            Discard the packet
        ENDIF
    ELSE
        IF (the Opcode is KeepAlive or Alive) THEN
            Discard the packet
        ENDIF
    ENDIF
45 Create and initialize a profile for this user

Set the profile state to Incomplete

50 IF (the Opcode is Query) THEN
    Reinitialize the user's profile and set the profile state to Incomplete

    FOR (each Authentication Name in the packet) DO
        IF (the Authentication Name is not recognized) THEN
            Discard the packet
        ENDIF
    NEXT
55 Remember the Authentication Names in the user's profile

60 ELSE IF (the Opcode is Willing) THEN
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IF (the Authentication Name in the packet is not recognized) THEN  
     Discard the packet  
 ENDIF

65

IF (the Authentication Name is not one of the authentication names recorded in the user's  
 profile from the Query packet) THEN  
     Discard the packet  
 ENDIF

70

Remember this Authentication Name in the user's profile

IF (the Hostname supplied by the server is NOT syntactically valid) THEN  
     Discard the packet  
 ENDIF

75

IF (the Status string is NOT composed of printable characters) THEN  
     Discard the packet  
 ENDIF

80

ELSE IF (the Opcode is Unwilling) THEN  
     IF (the Hostname supplied by the server is NOT syntactically valid) THEN  
         Discard the packet  
     ENDIF

85

IF (the Status string is NOT composed of printable characters) THEN  
     Discard the packet  
 ENDIF

Reinitialize the user's profile and set the profile state to Incomplete

90

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ELSE IF (the Opcode is Request) THEN  
     IF (the X Display Number is invalid) THEN  
         Discard the packet  
     ENDIF  
 ENDIF

95

Remember this Display Number in the user's profile

FOR (each Connection Type in the packet) DO  
     IF (the Connection Type is not IP) THEN  
         Discard the packet  
     ENDIF  
 NEXT

100

FOR (each Connection Address in the packet) DO  
     IF (the Connection Address is not an IP address) THEN  
         Discard the packet  
     ENDIF

105

IF (the Connection Address does not match the user's IP address) THEN  
     Replace the Connection Address with the user's IP address  
 ENDIF  
 NEXT

110

IF (none of the Connection Addresses matched the user's IP address) THEN  
     Discard the packet  
 ENDIF

115

IF (the Authentication Name in the packet is not recognized) THEN

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120         Discard the packet
        ENDIF

125     IF (the Authentication Name does not match the Authentication Name recorded in the user's
        profile from the Willing packet) THEN
            Discard the packet
        ENDIF

130     IF (the lengths of the Authentication Name and Authentication Data are not both zero or
        non-zero) THEN
            Discard the packet
        ENDIF

135     FOR (each Authorization Name in the packet) DO
        IF (the Authorization Name is not recognized) THEN
            Discard the packet
        ENDIF
        NEXT

140     Remember the Authorization Names in the user's profile

    IF (if the Manufacturer Display ID contains invalid characters) THEN
        Discard the packet
    ENDIF

145     IF (if the Manufacturer Display ID does not match any previous recorded Display ID for this
        user) THEN
        Discard the packet
    ENDIF

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150 ELSE IF (the opcode is Accept) THEN  
Remember the Session ID in the user's profile

155 IF (the Authentication Name in the packet is not recognized) THEN  
Discard the packet  
ENDIF

160 IF (the Authentication Name does not match the Authentication Name recorded in the user's  
profile from the Request packet) THEN  
Discard the packet  
ENDIF

165 IF (the lengths of the Authentication Name and Authentication Data are not both zero or  
non-zero) THEN  
Discard the packet  
ENDIF

170 IF (the Authorization Name in the packet is not recognized) THEN  
Discard the packet  
ENDIF

175 IF (the Authorization Name does not match any of the Authorization Names recorded in the  
user's profile from the Request packet) THEN  
Discard the packet  
ENDIF

Remember the Authorization Name in the user's profile

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180 IF (the lengths of the Authorization Name and Authorization Data are not both zero or non-  
zero) THEN  
    Discard the packet  
ENDIF

185 ELSE IF (the opcode is Decline) THEN  
    IF (the Status string is NOT composed of printable characters) THEN  
        Discard the packet  
    ENDIF

190 IF (the Authentication Name in the packet is not recognized) THEN  
    Discard the packet  
ENDIF

195 IF (the Authentication Name does not match the Authentication Name recorded in the user's  
profile from the Request packet) THEN  
    Discard the packet  
ENDIF

200 IF (the lengths of the Authentication Name and Authentication Data are not both zero or  
non-zero) THEN  
    Discard the packet  
ENDIF

Reinitialize the user's profile and set the profile state to Incomplete

205 ELSE IF (the opcode is Manage) THEN  
    IF (the Session ID does not match the Session ID recorded in the user's profile from the  
Accept packet) THEN

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Discard the packet  
ENDIF

IF (the X Display Number is invalid) THEN  
Discard the packet  
ENDIF

IF (the Display Number does not match the Display Number recorded in the user's profile  
from the Request packet) THEN  
Discard the packet  
ENDIF

IF (if the Display Class contains invalid characters) THEN  
Discard the packet  
ENDIF

IF (if the Display Class does not match any previous recorded Display Class for this user)  
THEN  
Discard the packet  
ENDIF

Set the user's profile state to Complete

ELSE IF (the opcode is Refuse) THEN

IF (the Session ID does not match the Session ID recorded in the user's profile from the  
Accept packet) THEN  
Discard the packet  
ENDIF



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ELSE IF (the opcode is Failed) THEN
  IF (the Session ID does not match the Session ID recorded in the user's profile from the
  Accept packet) THEN
    Discard the packet
  ENDIF
240

IF (the Status string is NOT composed of printable characters) THEN
  Discard the packet
ENDIF

Reinitialize the user's profile and set the profile state to Incomplete
245

ELSE IF (the opcode is KeepAlive) THEN
  IF (the X Display Number is invalid) THEN
    Discard the packet
  ENDIF
250

IF (the Display Number does not match the Display Number recorded in the user's profile
from the Manage packet) THEN
  Discard the packet
ENDIF
255

IF (the Session ID does not match the Session ID recorded in the user's profile from the
Manage packet) THEN
  Discard the packet
ENDIF
260

ELSE IF (the opcode is Alive) THEN
  IF (the Session Running flag is not 0 or 1) THEN
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265         Discard the packet
        ENDIF

270     IF (the Session Running flag is True) THEN
        IF (the Session ID does not match the Session ID recorded in the user's profile from
        the Manage packet) THEN
            Discard the packet
            ENDIF
        ELSE – the Session Running flag is False
            IF (the Session ID is not zero) THEN
                Discard the packet
                ENDIF
275     ENDIF

        Reinitialize the user's profile and set the profile state to Incomplete
        ENDIF

280     ELSE – the XDMCP Opcode is not allowed
            Discard the packet
            ENDIF
        ELSE – the XDMCP Opcode is being sent in the wrong direction
            Discard the packet
            ENDIF
285     ELSE – the XDMCP Opcode is not on the allowed-opcodes list
            Discard the packet
            ENDIF
        ELSE – the server port is not for the XDMCP protocol
            Discard the packet
            ENDIF
290     ELSE – neither of the IP ports are on the allowed-ports list
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295         Discard the packet
        ENDIF

        ELSE IF (it is an IP/TCP packet) THEN
            IF (this packet is for an established TCP connection) THEN
                IF (the TCP RST flag is set) THEN
                    300             Close this connection immediately

                IF (this is the last connection with this user) THEN
                    Reinitialize the user's profile and set the profile state to Incomplete
                    305             ENDIF

                ELSE IF (the TCP FIN flag is set for the first time for this connection) THEN
                    Remember that the FIN flag was set in the user's profile

                    Record that the FIN flag was observed at the current date/time
                    310             ENDIF

                ELSE -- the packet is not for an established TCP connection
                    IF (the packet TCP SYN flag is set and the TCP ACK flag is not set) THEN
                        Check the source and destination ports against a list of allowed well-known TCP ports

                        IF (either port is on the allowed port list) THEN
                            Check if the TCP connection is being opened in an allowed direction, i.e. the SYN packet is from the
                                server to an allowed user port or from the user to an allowed server port

                            IF (the TCP connection is being opened in an allowed direction) THEN
                                Check if the user port is for the X-Windows protocol

                                IF (this is an X-Windows connection) THEN
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325 IF (there is not an existing profile for this user) THEN
      Discard the packet
    ELSE – there is an existing profile for this user
      IF (the state of the user's profile is not Complete) THEN
        Discard the packet
      ENDIF
330 IF (the user port does not correspond to the X Display Number in the user's profile)
    THEN
      Discard the packet
    ENDIF
335 ENDIF
      Remember this connection in the user's profile
    ELSE – the TCP connection is being opened in a disallowed direction
      Discard the packet
340 ENDIF
    ELSE – neither of the IP ports are on the allowed-ports list
      Discard the packet
    ENDIF
    ELSE – this is not a TCP SYN packet
      Discard the packet
345 ENDIF
      Remember the current date/time as that of the last packet on this connection
    ELSE – it is neither and IP/UDP or IP/TCP packet
      Discard the packet
350
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    ENDIF
    ELSE – it is a non-IP packet
        Discard the packet
355  ENDIF
```